SOUTH FLORIDA WATER MANAGEMENT DISTRICT

EVERGLADES STORMWATER PROGRAM BASINS SOURCE CONTROL SCHEDULES AND STRATEGIES

ANNUAL REPORT

Environmental Resource Regulation Department

2004

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LIST OF ACRONYMS

BDD	Bonaventure Development District
BMP	Best Management Practice
BSFS	Basin Specific Feasibility Studies
CBWCD	Central Broward Water Control District
CERP	Comprehensive Everglades Restoration Plan
CSOP	Combined Structural and Operational Plan
District	South Florida Water Management District
EAA	Everglades Agricultural Area
ECP	Everglades Construction Project
EFA	Everglades Forever Act
ENP	Everglades National Park
EQIP	Environmental Quality Improvement Program
EPA	Everglades Protection Area
ESP	Everglades Stormwater Program
FDEP	Florida Department of Environmental Protection
FDACS	Florida Department of Agriculture and Consumer Services
HSWCD	Hendry Soil and Water Conservation District
ITDD	Indian Trace Development District
LTP	Everglades Protection Area Tributary Basins Long-Term Plan for Achieving Water Quality Goals
LWDD	Lake Worth Drainage District
NNRC	North New River Canal
Non-ECP	Non-Everglades Construction Project
NRCS	Natural Resource Conservation Service
NSID	North Springs Improvement District
OPWCD	Old Plantation Water Control District
PAID	Plantation Acres Improvement District
PDT	Project Delivery Team
POP	Public Outreach Plan
ppb	Parts per billion
RAS	Regulatory Action Strategy
SBDD	South Broward Drainage District
STA	Stormwater Treatment Area
TP	Total Phosphorus
UF-TREC	University of Florida Tropical Research and Education Center
USACE	US Army Corps of Engineers
VOW	Village of Wellington
WCA	Water Conservation Area
WY	Water Year (May 1 to April 30)

EXECUTIVE SUMMARY

The purpose of this document is to provide a detailed description of the phosphorus source control schedules and strategies being implemented in the Everglades Stormwater Program (ESP) Basins to meet the phosphorus criterion in the Everglades Protection Area (EPA) established by the 1994 Everglades Forever Act (EFA) and the October 27, 2003, Everglades Protection Area Tributary Basins Long-Term Plan for Achieving Water Quality Goals (LTP). It describes current source control measures, the progress made to date, and future strategies being developed through an adaptive management process.

The 1994 EFA set into action a comprehensive plan for protecting and restoring a significant portion of the Everglades ecosystem. Among other things, the EFA required the South Florida Water Management District (District) to apply for and receive the Non-Everglades Construction Project (Non-ECP) permit from the Florida Department of Environmental Protection (FDEP) to operate and maintain all water control structures, not covered by the Everglades Construction Project, that discharge into, within, or from the EPA. The EFA also required the District to develop and submit a long term compliance permit application to the FDEP by December 31, 2003. This application was submitted and it included the October 27, 2003, LTP. The long term compliance permit had not been issued by the FDEP as of November 1, 2004. The LTP proposes a combination of source controls and integration with diversion and construction activities planned as part of the Comprehensive Everglades Restoration Plan (CERP) and/or other federal projects to meet the phosphorus criterion and state water quality standards in the EPA. The LTP also includes cost estimates, funding mechanisms, and implementation schedules of the proposed plan.

The primary focus of the ESP is the Non-ECP "into" structures, that is, those discharging directly to the EPA. There are ten "into" structures identified in the Non-ECP permit and they are located in eight ESP Basins. These ESP Basins, also referred to as Non-ECP Basins, and their respective "into" structures (identified in parenthesis) are as follows:

- ACME Improvement District (ACME 1DS and G-94D)
- North Springs Improvement District (NSID 1)
- C-11 West Basin (S-9, S-9A)
- North New River Basin (G-123)
- Feeder Canal Basin (S-190)
- L-28 Basin (S-140)
- Boynton Farms Basin
- C-111 Basin (S-18C, S-175, S-332)

This document describes the combination of source controls, diversion strategies, and capital improvement projects implemented and/or proposed in each of the ESP Basins to meet the phosphorus criterion in the EPA. It includes structural and non-structural best management practices and public outreach activities by each stakeholder, as well

as the timelines for their implementation. The ESP Basins source control schedules and strategies are a result of close coordination between the District and stakeholders (including local governments, special drainage districts, the Miccosukee and Seminole Indian tribes, environmental interest groups, agricultural and urban communities, and other state and federal agencies) and are consistent with the LTP.

Table ES-1 summarizes water quality data for total phosphorus collected during Water Year 2004 (May 1, 2003 to April 30, 2004) for each ESP Basin. A more detailed total phosphorus water quality data summary for each basin is presented in **Appendix B** of this document.

Table ES-1. Summary of ESP Basins discharge total phosphorus (TP) concentrations and loads for Water Year (WY) 2004

Basin	Primary Land Use	TP Concentration (flow-weighted mean, ppb[1])	TP Load (metric tons)
ACME Improvement District (Basin B)	Urban	89	2.2
North Springs Improvement District (NSID)	Urban	(no flow)[2]	(no flow)[2]
North New River	Urban	16	.05
C-11 West	Urban	16	5.1
C-111	Urban	9	1.8
L-28	Agricultural	42	7.0
Feeder Canal	Agricultural	99	14.4
Boynton Farms	Agricultural	(n/a)[3]	(n/a)[3]

[1] Flow-weighted mean concentration in parts per billion (ppb).

[2] There were no discharges from the NSID basin to the EPA during WY 2004.

[3] There is no instrumentation in place for flow monitoring from this area.

1.0 INTRODUCTION/OVERVIEW

1.1 Purpose

The purpose of this document is to provide a detailed description of the phosphorus source control schedules and strategies being implemented in the Everglades Stormwater Program (ESP) Basins to meet the phosphorus criterion in the Everglades Protection Area (EPA) established by the 1994 Everglades Forever Act (EFA) and the October 27, 2003, Everglades Protection Area Tributary Basins Long-Term Plan for Achieving Water Quality Goals (LTP). It describes current source control measures, the progress made to date, and future strategies being developed through an adaptive management process.

1.2 Everglades Forever Act

In 1994 the State of Florida passed the EFA, S373.4592, F.S., which set into action a comprehensive plan for restoring a significant portion of the remaining two-million acre Everglades ecosystem through a program of construction projects, research and regulation. The goals and legislated requirements of the Everglades program address water quality, water quantity (including hydroperiod) and the invasion of exotic species in the Everglades ecosystem. The initial efforts of the South Florida Water Management District (District) focused, in part, on the largest Everglades tributary basins, the Everglades Agricultural Area (EAA) and the C-139 Basin. This effort included the construction of massive stormwater treatment marshes or areas (STAs), referred to as the Everglades Construction Project (ECP) and regulated by the Florida Department of Environmental Protection (FDEP) under permits collectively known as ECP permit. The District's Everglades Regulatory Program, mandated by the EFA, provides for the implementation of Best Management Practices (BMPs) as point source treatment for the EAA and C-139 Basin areas upstream of the STAs.

The EFA also required the District to apply for a permit from the FDEP to operate and maintain water control structures (pumps, gates, culverts), which discharge into, within or from the EPA and are not part of the ECP. The EFA required the District to provide schedules, strategies and a monitoring program to ensure compliance with state water quality standards for discharges from the structures. The areas delineated by the tributary basins that include the Non-ECP "into" structures are known as the Non-ECP Basins.

The EFA also required the District to develop and submit a long term compliance permit application to the FDEP by December 31, 2003. This long term compliance permit application was to include detailed plans for achieving and maintaining state water quality standards in the EPA.

1.3 Non-Everglades Construction Project Permit

The District's Non-ECP permit application was submitted to the FDEP in September 1994. FDEP formally issued permit #06, 502590709 to the District on April 20, 1998. The permit authorizes the operation and maintenance of 37 structures within control of the District discharging into, within or from the EPA, which are not included in the ECP.

The Non-ECP permit required the District to implement schedules and strategies for:

- Achieving and maintaining state water quality standards;
- Evaluating existing programs, permits and water quality data;
- Acquiring lands, construction and operation of water treatment facilities;
- Developing a funding mechanism; and
- Developing a regulatory program to improve water quality, including identifying structures or systems requiring permits or modifications to existing permits.

Also, the Non-ECP permit required the District to develop a monitoring program to ensure the accuracy of data and measure progress toward achieving compliance with water quality standards.

1.4 Everglades Stormwater Program

Upon issuance of the Non-ECP permit, the District created the Everglades Stormwater Program, or ESP. The primary focus of the ESP is the Non-ECP "into" structures, that is, those discharging directly to the EPA. The ESP is charged with implementing programs and projects to achieve state water quality standards. There are ten "into" structures identified in the Non-ECP permit and they are located in eight ESP Basins. **Figure 1** displays the location of the ESP hydrologic tributary basins and **Table 1** lists the "into" structures associated with each ESP Basin. The ESP Basins are also referred to as Non-ECP Basins.

To facilitate the District's implementation of EFA mandates, the ESP developed several program elements. These elements were:

- Water Quality Monitoring
- Reporting Requirements
- Regulatory Action Strategy
- Water Quality Improvement Plans
- Financial Assessments
- Public Involvement

The peer-reviewed 2000 through 2004 Everglades Consolidated Reports summarize the available data and findings related to each of these ESP elements. These reports can be found at:
http://www.sfwmd.gov/org/ema/everglades/previous.html.

Table 1. List of Non-ECP "into" structures associated with each ESP Basin

Non ECP Structure	ESP Basin	County	Description
ACME 1DS	ACME Improvement District	Palm Beach	1-72" diameter culvert w/ stem lift gate
G-94D	ACME Improvement District	Palm Beach	2-72" diameter culverts w/ stem lift gates
NSID 1	North Springs Improvement District	Broward	4 unit pump station w/ 444 cfs design capacity
G-123	North New River Canal	Broward	4 unit pump station w/ 400 cfs design capacity
S-9	C-11 West	Broward	3 unit pump station w/ 2,880 cfs design capacity
S-9A	C-11 West	Broward	4 unit pump station w/ 500 cfs design capacity
S-140	L-28	Broward	3 unit pump station w/ 1,300 cfs design cap and gated spillway w/ vertical lift gate
S-190	Feeder Canal	Hendry	Gated spillway w/ 2 vertical lift gates
S-18C	C-111	Miami-Dade	Gated spillway w/ 2 vertical lift gates
S-175	C-111	Miami-Dade	3-84" diameter culverts w/ sluice gates
S-332	C-111	Miami-Dade	9 unit pump station w/ 465 cfs design capacity

Figure 1. Tributary basins, water control structures and other features related to the ESP

1.5 Regulatory Action Strategy

The Non-ECP permit requirements were executed through the steps outlined in the Regulatory Action Strategy (RAS) discussed below. The RAS was incorporated by reference under Special Condition No. 9 of the Non-ECP permit, 'Schedules and Strategies', as part of supplemental information submitted to the FDEP in September 1997.

The primary purpose of the RAS was to conduct a thorough assessment of each ESP Basin using a systematic approach so that current and appropriate geographically based information and data were used to develop scientifically-based and technically defensible water quality improvement strategies. The RAS utilized predefined sequential steps to develop and improve the water quality monitoring plan at the basin level, the results of which are the basis for the improvement strategies. The steps were designed to assess existing data and permits, enhance and coordinate water quality monitoring programs, analyze the water quality and develop remedial actions in cooperation with the public and local governmental entities. The remedial actions may include any combination of voluntary BMPs, requirement and/or modification of permits, construction projects and basin-specific regulatory programs to achieve compliance with state water quality standards. The 2002 RAS report can be found at: http://www.sfwmd.gov/org/reg/esp/pdfs/rasrpt2002/rasrpt2002.htm.

The RAS identified all Non-ECP structures discharging directly into the EPA. The RAS steps were then applied at the basin level for the each of these discharge structures. The first step included identifying all primary "into" structures and their locations, gathering structure data, determining contributing drainage basins, identifying the owner/operator, operational criteria and permit status.

The next two steps required the District to characterize and continue to monitor water quality at the Non-ECP "into" structures. District data (DBHydro) were used for the historical record and the monitoring program provided data for future water quality characterization. Lastly, a technical evaluation was completed to lay a foundation for the development of water quality improvement plans. Once these steps were completed for the Non-ECP "into" structures, the RAS steps of inventory, characterization, monitoring and evaluation were applied to discharges upstream of the "into" structures. When these sources of discharge were identified as cause for water quality concern, they were referred to as "hot spots." Once hot spots were identified, they were monitored and regulated, as appropriate. The result was a strategy to develop remedial actions in cooperation with the local government entities.

1.6 Basin Specific Feasibility Studies and Long Term Plan

In order to achieve the goals of the EFA, the District has conducted Basin Specific Feasibility Studies (BSFS) to integrate information from research, the RAS and planning studies to evaluate alternative combinations of basin level source controls, regional treatment and advanced treatment technologies to meet final water quality objectives of

the Everglades. The BSFS final report for the ESP Basins, dated October 2002, can be found at:
http://www.sfwmd.gov/org/erd/bsfboard/BSFS_ESP_Final_Report.pdf.

The results of the BSFS were used to develop the LTP. The LTP incorporated directions received from the legislature, as well as comments received from various stakeholders and the public. The October 27, 2003, final version of the LTP can be found at:
http://www.sfwmd.gov/org/erd/bsfboard/waterquality.pdf.

During the 2003 legislative sessions, the 1994 EFA was amended to include reference to the LTP as the appropriate strategy for achieving the long-term water quality goals for the EPA. The LTP was submitted to the FDEP in December 2003 according to the following permit requirements of the amended EFA:

> *By December 31, 2003, the District shall submit to the department [FDEP] an application for permit modification to incorporate proposed changes to the Everglades Construction Project and other district works delivering water to the Everglades Protection Area as needed to implement the pre-2006 projects and strategies of the Long-Term Plan in all permits issued by the department, including the permits issued pursuant to subsection (9). These changes shall be designed to achieve state water quality standards, including the phosphorus criterion and moderating provisions…*

The long term compliance permit had not been issued by the FDEP as of November 1, 2004. The LTP proposes a combination of source controls and integration with diversion and construction activities planned as part of the Comprehensive Everglades Restoration Plan (CERP) and/or other federal projects to meet the phosphorus criterion and state water quality standards in the EPA. The LTP also includes cost estimates, funding mechanisms, and implementation schedules of the proposed plan.

2.0 EVERGLADES STORMWATER PROGRAM BASINS SOURCE CONTROL SCHEDULES AND STRATEGIES (WATER QUALITY IMPROVEMENT PLANS)

There are eight ESP Basins (**Figure 1**):

- ACME Improvement District Basin
- North Springs Improvement District Basin (NSID)
- C-11 West Basin
- North New River Canal Basin (NNRC)
- Feeder Canal Basin
- L-28 Basin
- Boynton Farms Basin (a group of 3 farms located west of Boynton Beach)
- C-111 Basin

This section presents comprehensive water quality improvement plans developed for each ESP Basin. The water quality improvement plans include the combination of source controls, diversion strategies, and capital improvement projects implemented and/or proposed in each of the ESP Basins to meet the phosphorus criterion in the EPA. It includes structural and non-structural best management practices and public outreach activities by each stakeholder, as well as the timelines for their implementation. A brief basin description, including water quality monitoring results is included for each ESP Basin.

The ESP Basins source control schedules and strategies (water quality improvement plans) are a result of close coordination between the District and stakeholders (including local governments, special drainage districts, the Miccosukee and Seminole Indian tribes, environmental interest groups, agricultural and urban communities, and other state and federal agencies) and are consistent with the LTP.

A major component of the water quality improvement plans is public education. District staff has developed an ESP Website (http://www.sfwmd.gov/org/reg/esp/), which includes extensive information about the program as well as relevant BMP documents such as the Turf and Landscape BMP Manual for the C-11 West Basin (http://www.sfwmd.gov/org/exo/broward/c11bmp/index.html) and the Urban Stormwater BMPs (http://www.sfwmd.gov/org/reg/esp/pdfs/bmp_manual.pdf).

District staff has prepared a Public Outreach Plan (POP) for the ESP basins (See **Appendix A**). The POP includes both new components and enhancements to the existing public outreach initiatives being implemented in the C-11 West Basin. The plan also coordinates public outreach initiatives being conducted by other District departments and governmental agencies to maximize resources and target audiences. Additional details of the ESP public outreach initiatives are described in the POP. The POP will benefit all basins within the ESP, but it will focus primarily on Broward County's ESP basins. Three of the eight ESP basins (C-11 West, NNRC and NSID) are located within Broward County. Public outreach strategies that are specific to the ESP basins

within Broward county are described below. Implementation of the POP is expected to start in Fall 2004.

Broward County stakeholders have worked with District staff on enhancements to the District's "Know-the-Flow" seminar to include a turf and landscape BMP components. The "Know-the-Flow" seminar presents information about primary, secondary and tertiary stormwater management systems in lay-man terms. The goal is to have the more than 10,000 property managers in Broward County take this enhanced seminar to earn continuing education credits to maintain their licenses. Enhanced "Know-the-Flow" seminars for Broward County property managers have been offered monthly since April 2004.

District staff and stakeholders in Broward County have also formed working groups to develop nursery BMPs and equine BMPs for voluntary implementation. The purpose of these working groups is to develop area-specific BMPs for these industries and to disseminate this information to the local business owners. A Nursery BMP Grant program for the C-11 West Basin, which will assist nursery owners with the implementation of BMPs, is expected to be established in 2005. The Florida Department of Agriculture and Consumer Services (FDACS) is assisting in the development of these BMPs by providing facilitation, coordination, organization, expertise, and publication resources. Once the nursery and equine BMP manuals are completed, FDACS plans to adopt them through the state rulemaking process. The BMP manuals are expected to be completed by December 2004, and adopted by state rule by December 2005.

As recommended in the LTP, the District has partnered with the Broward County Department of Planning and Environmental Protection in coordinating a county-wide working group to develop a comprehensive pollution prevention plan with specific water quality goals and milestones. The working group, known as Broward Everglades Working Group, was established in May 2004. The Working Group members include representatives from government agencies, water management authorities (special drainage districts), local municipalities, and other stakeholders. The District will pursue pollution prevention activities such as erosion and sedimentation control enforcement during construction, promotion of turf and landscape BMPs for golf courses, adoption of pollution prevention ordinances, support and coordination of the District's POP, etc. A comprehensive pollution prevention plan is expected to be completed by December 2004.

2.1 ACME Improvement District Basin (Village of Wellington)

The ACME Improvement District (**Figure 2**) is a dependent district of the Village of Wellington (VOW). The VOW occupies approximately 30 square miles and is located west of State Road 7, south of State Road 80 and east of Water Conservation Area (WCA) 1 in Palm Beach County. Land-use within this Basin is mostly residential in the northern portion (Basin A). Rural/agricultural areas are predominant in the southern portion (Basin B). There are also a number of horse farms and other equestrian

facilities in Basin B. The major portion of Basin B, totaling 8,680 acres, and some drainage overflows from Basin A discharge via two pumps to the L-40 borrow canal within the Arthur R. Marshall Loxahatchee National Wildlife Refuge, also known as WCA 1. These two pump stations are known as VOW1 and VOW 2. The discharges from VOW1 and VOW2 flow through the culvert structures ACME 1DS and G94D, respectively, into the L-40 borrow canal.

The District has been collecting grab samples for water quality at the two main discharge points into the WCA 1 (ACME 1DS and G94D) since the beginning of 1997. In March of 1999, The District and the VOW entered into a water quality monitoring agreement that included the installation of composite autosamplers and flow recorders with telemetry at the VOW1 and VOW2 pump stations. **Appendix B** includes flow-weighted mean total phosphorus (TP) concentrations for ACME 1DS and G94D for Water Years (WYs) 1998 through 2004. The composite flow-weighted mean TP concentration for WYs 2001 through 2004 average 80 ppb at ACME 1DS and 128 ppb at G94D.

The 1999 agreement also provided for upstream water quality monitoring (grab samples) at representative land use sites during flow events. A summary of the upstream water quality data and a map of the ACME Improvement District Basin showing these data are included in **Appendix B**. Results from upstream monitoring reveal TP concentrations generally ranging from 20 ppb to 200 ppb. TP concentrations below 50 ppb are associated with areas where permitted surface water management systems with substantial lake areas exist. Concentrations higher than 100 ppb are primarily associated with areas that have predominantly agricultural/nursery/equine land uses within Basin B.

The VOW and the District executed a second cooperative agreement in May 2000 for the implementation of a water quality improvement plan. The plan included the implementation of BMPs, operational changes in the local water management system, and development of several alternatives to resolve water quality concerns in the Basin B area. As a result of this agreement, VOW has implemented a BMP ordinance that addresses the storage, handling and transport of livestock waste; the proper use, storage and application of fertilizer (requiring the application of low phosphorus fertilizer only); and irrigation practices. The VOW has implemented an education campaign regarding water quality and BMPs and has a dedicated staff member to oversee compliance with the BMP ordinance and other environmental related ordinances. The VOW has also implemented several maintenance BMPs within its canal right-of-ways, including raised inlets, sediment sumps, sediment removal and canal vegetation harvesting.

The District entered into a third cooperative agreement with the VOW on September 2003 that will provide a District's cost share of up to $50,000 toward the remediation of "hot spots" within Basin B through a BMP implementation plan. The VOW will be designing and implementing agreed upon BMPs. Implementation of BMPs under this agreement is expected to be completed by September 2006.

To assist the VOW, the District has enhanced requirements for water quality treatment and BMPs in Environmental Resource Permit applications for the area and has been successful in issuing permits that exceed the required water quality treatment criteria, including permits for innovative BMPs designed to reduce discharges of nutrients into the VOW canal system. The District has dedicated staff members to oversee increased compliance and enforcement activities in Basin B.

For this basin, the LTP relies on the implementation of source controls and the ACME Basin B Discharge Project that will divert all Basin B stormwater flows to the STA 1E by way of the C-51 West Canal. The ACME Basin B Discharge Project, a component of the CERP, is in the Project Implementation Report development phase. The District has purchased 374 acres within Section 24, west of the VOW, for future use in the CERP project as a wetland area with flood water storage capability and environmental feature. To complement the CERP project, the VOW's conveyance system will be substantially modified to enable the diversion of flows from Basin B into Basin A, and then into the C-51 West Canal. Once these modifications are built, the VOW1 and VOW2 pumps will no longer discharge stormwater flows to the WCA 1. Representatives from the District, VOW, U.S. Army Corps of Engineer (USACE), and other agencies are part of the Project Delivery Team (PDT) and are pursuing the completion of this project by the end of 2006.

The LTP recommends the allocation of $100,000 to assist the VOW in developing, evaluating and implementing source controls or BMPs (Project Bc75 – Fiscal Years 2005-06). The District expects to use these funds to enter into a fourth cooperative/cost-share agreement with the VOW to develop additional BMP implementation plans by December 2005.

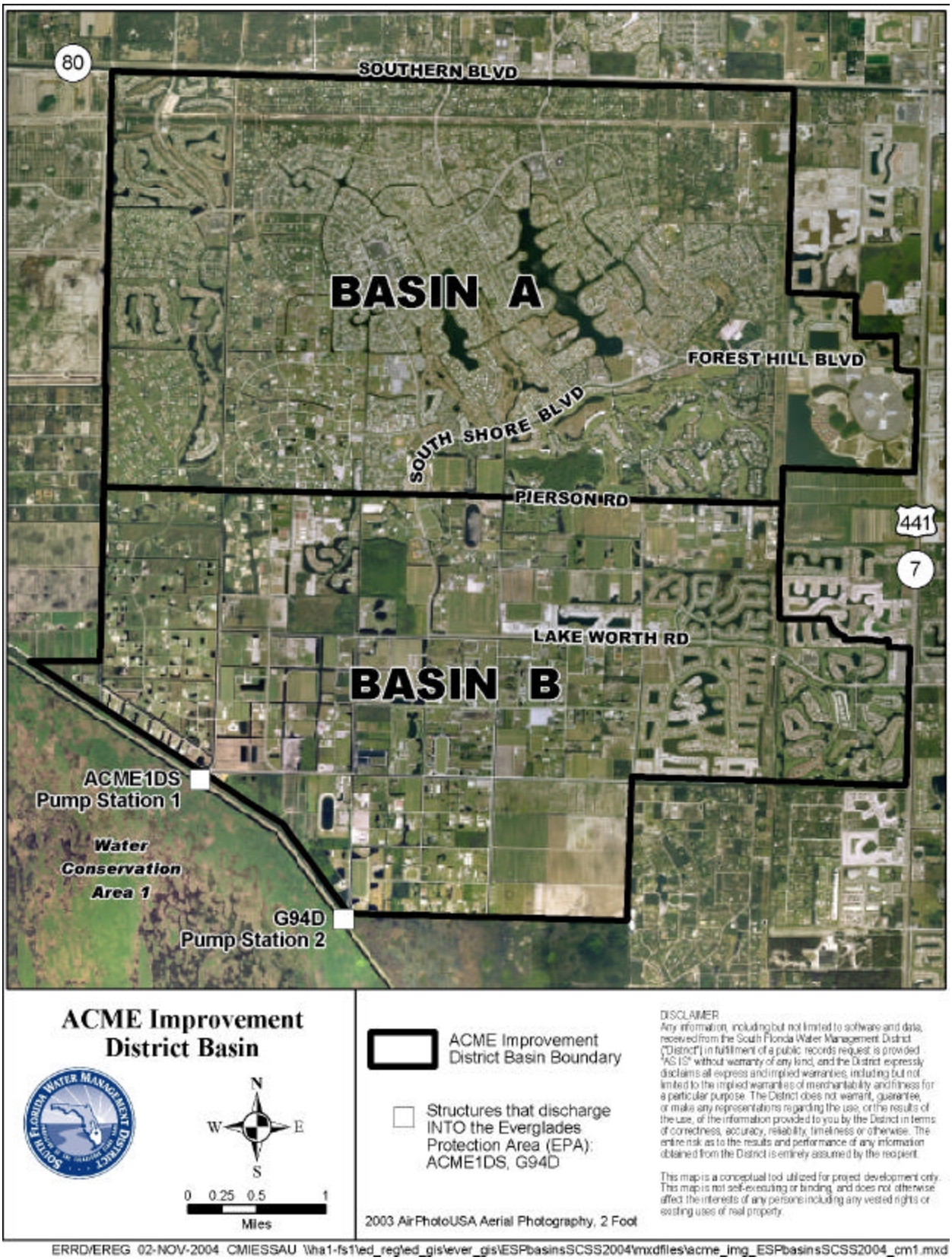

Figure 2. ACME Improvement District Basin

2.2 North Springs Improvement District Basin

The NSID Basin (**Figure 3**) has an area of approximately 11 square miles, or 7,064 acres. It is located in northern Broward County along the eastern border of WCA 2A. The northern boundary is the Broward-Palm Beach county line. The Sawgrass Expressway transects the area, entering from the east and turning south as it exits along the western border. The basin is completely within the NSID and includes the northern portion of the City of Coral Springs (north of Wiles Road) and the western portion of the City of Parkland (west of University Drive). Agricultural lands in the northern part of NSID are being converted into residential development.

Two pump stations, NSID Pump Stations #1 and #2, are used to discharge stormwater north along the L-36N borrow canal to the Hillsboro Canal, which discharges to tide. The NSID is included in the ESP because the NSID Pump Station #1 is permitted to pump into WCA 2A when the L-36N borrow canal and Hillsboro canal are not capable of accepting additional flows.

In September 2000, the District and the NSID entered into a cooperative agreement that provided a District's cost share of $50,000 to address water quality and quantity concerns. The intended objective of this agreement was for local programs to more effectively monitor and improve water quality to meet the objectives of the EFA. The NSID surface water management master permit was modified to require both discharge and upstream monitoring of water quality during flow, in accordance with the steps in the RAS.

The District and NSID have been monitoring the water quality at the NSID Pump Station #1 since 1990. A composite autosampler was installed at this pump station in 2001. No TP data from this autosampler was available during WYs 2002 through 2004 because of either the failure of the analytical reports to include quality assurance/quality control (QA/QC) data that are required for all water quality data submitted to the District, or lack of flows into WCA 2A. **Appendix B** includes arithmetic average (grab samples) and flow-weighted mean TP concentrations for NSID Pump Station #1 for WYs 1998 through 2004. The arithmetic average of TP concentrations for grab samples in the last three WYs is approximately 23 ppb.

In accordance with the cooperative agreement, monitoring at upstream sites was initiated to identify possible sources of TP. A summary of the upstream water quality data and a map of the NSID Basin showing these data are included in **Appendix B**. The average TP concentration at NSID Pump Station #2 (NSIDNP02), during the period of June 2001 to the present, was 41 ppb. The inputs from the eastern basin, through site NSIDEC02, show lower levels of TP at 28 ppb. The unique characteristics of this eastern basin versus other areas in NSID are that the control elevation is 9 feet NGVD and it is completely developed, whereas the western basin has a control elevation of 7 feet NGVD and it has ongoing development activities and operating golf courses. Historically the highest upstream levels of TP were found in the discharges from the northern sub-basin with averages at three monitoring sites over the period of record,

June 2001 to the present, of 49, 88 and 178 ppb. This basin was previously an agricultural area, but it is in the process of being converted to residential and commercial uses over the next few years. The development plans for these areas will include water management provisions that will exceed the minimum permit criteria and provide additional storage and water quality treatment. It is expected that 95 percent of the currently undeveloped areas in the northern part of the basin will be developed by December 2006. Based on sample results, the best water quality in the entire basin is at NSID Pump Station #1, which has a large attenuation lake directly preceding it.

Because the NSID Basin preferentially discharges to the Hillsboro Canal via the L-36N borrow canal and only pumps to WCA 2A during times of potential flooding, significant reductions in discharges to WCA 2A may be possible through additional storage in the basin or redirection of excess flows. Operational BMPs (more effective management of pump regimes) have been implemented which have reduced discharges from this basin into WCA 2A. As a result, the last two confirmed discharges from NSID Pump Station #1 into WCA 2A occurred in July 2002 and September 2004.

The NSID has installed an inter-basin transfer pump station, with a capacity of 25,000 gallons per minute, that will move water to the east during times of high water in the western basin, which will serve to further reduce the need to pump to WCA 2A. Telemetry with remote pump control, level sensors, pump discharge adjustment and other important operational appurtenances will be installed and utilized to maximize pumping efficiencies and further reduce the need to pump into WCA 2A. The telemetry installation is expected to be completed by December 2006.

The NSID currently requires the renewal of surface water permits every 5 years to ensure the stormwater management systems are working appropriately. District staff is coordinating with Coral Springs and Parkland, which have areas within NSID basin boundaries, to pursue public outreach activities, develop water quality improvement and pollution prevention activities, and facilitate implementation of BMPs designed to reduce the flows and TP concentrations in their stormwater discharges. Much of the drainage infrastructure in this basin is under the control of local homeowner's associations. As part of the District's efforts, NSID stakeholders, and many others, are included in the District's POP and the Broward Everglades Working Group.

For this basin, the LTP relies on the implementation of source controls and the diversion of current NSID releases made to WCA 2A to the CERP Hillsboro Site 1 Project. The CERP Hillsboro Site 1 Project, scheduled for completion in 2007, consists of a 1,600 acre impoundment located on the north side of the Hillsboro Canal just east of WCA 1. The project also includes planned conveyance improvements to structure S-39A, located at the north end of L-36N borrow canal where flows enter the Hillsboro Canal, and improvements to a section of the Hillsboro Canal.

The LTP allocated funds to conduct a hydraulic/hydrologic evaluation of storm events in the NSID Basin to determine if there would be any negative impacts to the Hillsboro Canal from redirecting stormwaters away from WCA 2A to the CERP Hillsboro Site 1

Project (Project Bc71). This evaluation was to include an assessment of the potential for connecting adjacent lake areas to the NSID water management system for additional surface water storage (i.e., water management operations will be evaluated to determine how more water may be retained within the basin or discharges could be more tightly regulated to minimize the need to pump into WCA 2A except under extreme circumstances). The District hired a consultant to perform this evaluation, which was completed by July, 2004. The evaluation determined the water elevations on the Hillsboro Canal would increase during large storm events. The District plans to perform further analysis of this issue to evaluate potential mitigation measures. The District expects to complete this evaluation by July 2005. If mitigation measures are determined unfeasible, it may be possible that during a large storm event, some NSID flow would have to be discharged to the EPA to avoid flooding impacts in the Hillsboro Canal basin. Because of these possible negative effects, the LTP recommendation of redirecting all NSID flows away from the EPA may not be feasible. If necessary, the District will evaluate the potential TP loads that could be expected to enter the EPA during large storm events.

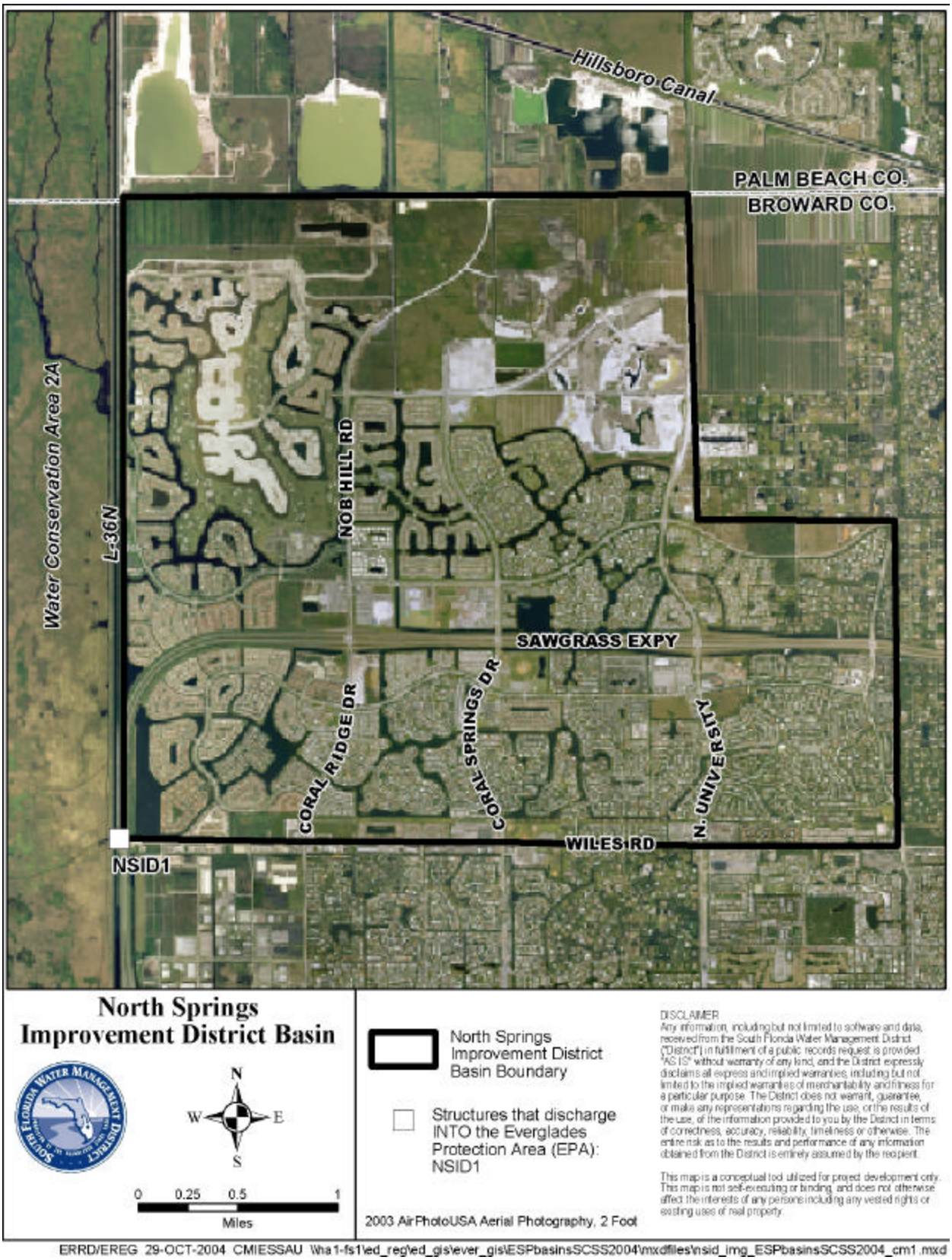

Figure 3. North Springs Improvement District Basin

2.3 C-11 West Basin

The C-11 West Basin (**Figure 4**) is a rapidly urbanizing basin located in south central Broward County west of Ft. Lauderdale that drains into the current Everglades system. This basin has an area of approximately 72 square miles, approximately 61 percent of which has been developed. Sixteen percent of the basin area is used for a combination of agriculture and nursery operations, and the remaining areas are wetlands, rangelands or forested uplands. The excess water in this basin, comprised of stormwater runoff and ground water seepage from the EPA, is pumped from the C-11 West Canal via the S-9 and S-9A pump structures into WCA 3A. The S-9A pump structure was put into operation in early 2003.

The C-11 West Basin covers most or parts of the cities of Weston, Sunrise, Cooper City and Pembroke Pines, the towns of Davie and Southwest Ranches and unincorporated areas of south central Broward County. There are three drainage districts within the C-11 West Basin (**Figure 4**): Indian Trace Development District (ITDD), South Broward Drainage District (SBDD) and Central Broward Water Control District (CBWCD). These drainage districts operate and maintain the secondary canals draining into the C-11 West Canal.

There has been extensive water quality monitoring at the primary discharge structure, the S-9 pump station. The District has been collecting grab samples for water quality data at this structure since December 1977 and a composite autosampler began collecting samples at S-9 in December 1996. **Appendix B** includes flow-weighted mean TP concentrations for S-9 for WYs 1998 through 2004. The composite flow-weighted mean TP concentration for WYs 2001 through 2004 averages 19 ppb. **Appendix B** also shows the composite flow-weighted mean TP concentration for S-9A at 13 ppb in WY 2004. The S-9A pump station discharges mostly seepage returns into WCA 3A and therefore expected to show smaller TP concentrations.

Pursuant to the RAS, the District entered into cooperative and cost share agreements with all three drainage districts within the C-11 West Basin (**Table 2**). The purpose of the agreements is to implement local water quality monitoring and improvement programs that will help meet the objectives of the EFA. The tasks include establishing public involvement activities, monitoring programs for upstream structures, and implementing appropriate BMPs designed to reduce nutrient loads being discharged in stormwater flows. The agreements include stipulations that require remedial actions be taken where "hot spots" are identified and may require construction of capital improvement projects.

Table 2. Agreements with local Drainage Districts in C-11 West Basin

Drainage District	Amount of Agreement	Date of Agreement
CBWCD	$50,000	September 2000
SBDD	$50,000	October 2000
ITDD	$15,000	May 2002

Upstream water quality monitoring has already yielded a significant amount of data indicating the concentrations of TP found in the basin. A summary of the upstream water quality data and a map of the C-11 West Basin showing these data are included in **Appendix B**. Results from upstream monitoring reveal TP concentrations generally ranging from 7 ppb to 50 ppb. TP concentrations between 7 ppb and 25 ppb are associated with areas where permitted surface water management systems exist. TP concentration between 25 ppb and 50 ppb are associated to older residential areas which lack permitted surface water management systems. It has also been observed that TP concentrations increase during periods of construction due to sediment erosion. Concentrations higher than 50 ppb are primarily associated with areas that have predominantly agricultural and/or nursery land uses.

Several public involvement activities are being implemented in the C-11 West Basin that include a variety of strategies aimed at educating stakeholders and the public. The aim of these educational programs is to motivate the residents and stakeholders in the basin to implement changes that will result in enhanced water quality and reduced TP content in stormwater discharges. To initiate the campaign, the District and the Broward County Extension Education Division hosted the first C-11 West Canal Basin Working Group early in 2000. The 36-member working group included representatives of landscaping interests, fertilizer industries, government agencies, colleges, universities, special interest groups and environmental organizations. The group developed turfgrass and landscaping BMPs that will help residents reduce pollution without sacrificing the basin's urban landscapes. The Turf & Landscape Best Management Practices Manual was incorporated into a "mini-website" that was posted on each of the working group member websites.

The District has been instrumental in forming the Freddy's Friends Club and the Teddy's Friends Club, the District's and CBWCD's mascots, respectively, at elementary schools in the basin. The program has also posted interpretive signs along the C-11 West Canal and selected secondary canals. The signs communicate the canal's role in flood protection, its connection to the Everglades and the concept that residents' activities affect water quality.

The C-11 West Basin includes a regulatory component to source controls. District's Environmental Resource Permits within this basin have been required, when necessary, to provide additional pretreatment facilities/features to offset adverse water quality impact from new developments.

For the C-11 West Basin, the LTP relies on the implementation of source controls and the CERP projects as the primary means of reducing TP discharges to WCA 3A from the C-11 West Basin. The Western C-11 Impoundment and Diversion Canal CERP Project, scheduled for completion in January 2006, consists of a 1,600-acre stormwater treatment area/impoundment within the C-11 West Basin and approximately 8 miles of canal that will divert flood waters to other CERP storage areas. This impoundment will be located north of the C-11 West Canal and east of U.S. Highway 27. This project is

complemented by the ongoing C-11 West Basin Critical Project. The Critical Project includes structural and operational changes to the water management system by isolating WCA 3A seepage from C-11 West Basin runoff. The combination of a proposed divide structure (S-381 - scheduled for completion by the end of 2004) and the S-9A pump station (completed) will contain and return seepage to WCA 3A. It is expected that the TP levels going into WCA 3A will be reduced by back-pumping clean seepage water and by decreasing operation of the larger S-9 pumps, which cause scour and drawdown. In addition, the North Lake Belt Storage CERP Project, scheduled for completion in June 2036, will further reduce to a minimum the stormwater flows pumped into WCA 3A through S-9.

The LTP allocated funds to conduct an evaluation of the potential connection between the Western C-11 Impoundment and the WCA 3A/3B Levee Seepage Management CERP projects and potential internal enhancements to the impoundment for water quality improvements (Project Bc73 – Fiscal Years 2004-05). The District hired a consultant to complete an evaluation of the stormwater treatment potential of the proposed Western C-11 Impoundment. The consultant determined that an additional 3 to 5 percent reduction in TP could be achieved if excess stormwater inflows are routed through the impoundment. ESP staff is working with the Water Preserve Area PDT to pursue a modification to the impoundment design and operation to accommodate the routing of excess flows.

The LTP also allocated funds to assist local communities in developing, evaluating and implementing source controls or BMPs (Project Bc73 – Fiscal Years 2005-06). These funds will also be used to help with the implementation of the POP (**Appendix A**) starting in Fall 2004.

Sections 2.3.1 through 2.3.3 below present source control schedules and strategies for each of the drainage districts within the C-11 West Basin.

2.3.1 South Broward Drainage District

Non-Structural BMPs:
SBDD is now requiring the renewal of surface water permits every 5 years to ensure the stormwater management systems are working appropriately. Owners renewing a permit for their property must have it inspected and certified by a professional engineer. If the inspection reveals a problem, this must be corrected prior to the certification.

SBDD personnel perform regular inspections and maintenance of canals. If livestock manure on or near a canal is determined to be a potential problem, the property owner is advised to take the appropriate corrective action. Property owners failing to take corrective actions may be referred to the County's Department of Planning and Environmental Protection.

Structural BMPs and Operational Changes:
Drainage facilities for the Sub-basins S-9 and S-10 of SBDD will be modified to provide additional stormwater treatment. Both basins, which total about 10 square miles, will be interconnected and control structures will provide 1.5 inches of stormwater runoff detention prior to discharging into the C-11 West Canal. Three control structures are planned to replace six unrestricted outfalls, which, at the present, do not provide for any detention within these basins. It is expected this project will be completed by December 2006. The District's CERP division is to contribute $1 million toward the cost of this $3.6-million project.

SBDD is also in the process of closing three more unrestricted outfalls located within sub-basin S-8. Stormwater runoff currently draining through these unrestricted outfalls will be re-routed through the existing SBDD S-8 pump station. $30,000 will be contributed by the District under its agreement with SBDD toward the cost of re-routing the flows through the S-8 pump station. It is expected the closing of the unrestricted outfalls will be completed by December 2005. In addition, the Surface Water Permit for this pump station will be modified to provide 1.5 inches of stormwater detention prior to discharge. This would provide an additional 0.5 inch detention over the current permit conditions. It is expected that operational changes associated with the permit modification will be implemented by December 2005.

Public Outreach:
The SBDD is in the process of developing a website that will have links to all BMP documents and manuals produced for this area. The website is expected to be functional by December 2004. In addition, SBDD has been and is an active participant of working groups that develop BMPs.

2.3.2 Central Broward Water Control District

Non-Structural BMPs:
CBWCD's surface water permits for construction include added special requirements such as:

- construction of littoral shelves in new lakes;
- renewal of surface water permits every 5 years;
- floodplain encroachment analysis;
- more stringent criteria if deemed necessary.

In addition, single family properties not served by a surface water management system are required to maintain 30% of the parcel undeveloped at its natural elevation and erect a berm to retain a 25-year, 3-day storm event. CBWCD ensures these requirements are met prior to issuing any permits to the single family property. CBWCD also has authority to require any property owners to correct existing and potential problems if deemed necessary. When maintaining canals, CBWCD personnel advise livestock owners if manure is determined to be a potential pollution problem for the canal.

Structural BMPs and Operational Changes:

In December 2003, the CBWCD completed a C-11 West Basin Comprehensive Facilities Report Update, which included the development of a stormwater model of the entire C-11 West Basin, identification of problem areas, evaluation of improvement alternatives, cost estimates and specific recommendations for flood and water quality control, including ranking of capital improvement projects. The report recommended $1.1 million in capital improvements for immediate implementation. CBWCD budgeted $400,000 in capital improvement projects for Fiscal Year 2004 to begin implementation of the capital improvement program. Additional funds will likely be budgeted for Fiscal Year 2005 to continue project implementation of the capital improvement projects. On October 22, 2003, the CBWCD Board of Commissioners passed a motion to work cooperatively with the District to fund and implement water quality improvement projects in the C-11 West Basin, and directed the CBWCD Engineer to begin detailed modeling and preliminary design of water control structures to be located at each of the points of discharge of the secondary canals into the C-11 West Canal. These water control structures are intended to supplement the over $1.1 million in capital improvement projects recommended in the C-11 West Facilities Report, which are currently underway and include new canals and culverts to redirect runoff from basins with limited storage to basins with excess storage capacity. Taking advantage of excess basin storage capacity reduces flood levels, improves water quality, increases aquifer recharge, and reduces the volume of runoff discharged by the CBWCD into the C-11 West Canal. The proposed water control structures are intended to further increase storage and retention capacity with the secondary canal system prior to discharge into the C-11 West Canal. The greatest benefit of these control structures will be to control runoff from older areas developed prior to modern regulatory requirements for stormwater management systems. By attenuating runoff, many pollutants settle out of the water column or are absorbed through biological processes.

The proposed water control structures are estimated to cost an additional $1 million, bringing the total cost of water quality improvement projects for the CBWCD western basin up to $2.1 million. The proposed structures are currently in preliminary design and should be ready to begin construction by Fiscal Year 2005. The District, under its agreement with CBWCD, contributed $39,000 to pay for the cost of preliminary design. The District's budget for Fiscal Year 2005 includes a $1 million legislative appropriation to help CBWCD pay for the construction of the water control structures.

Public Outreach:

CBWCD has a website with links to the C-11 West Turf and Landscape BMP site and in the future will have links to all BMP documents and manuals produced. Also, CBWCD does water quality presentations at local elementary schools and has established Freddy's and Teddy's Friends Clubs. The drainage district does water quality presentations for local homeowners associations and at public meetings in the towns of Davie and Southwest Ranches and sponsors and participates in the town of Davie Annual Waterway Cleanup in which CBWCD also distributes fliers and brochures that deal with water quality problems and pollution prevention. In addition, CBWCD has installed six interpretive signs at their secondary canals N-32, N-27, N-18, S-7, S-22

and S-35. CBWCD has been and is an active participant of working groups that develop BMPs.

2.3.3 Indian Trace Development District (City of Weston)

The City of Weston has direct control of Indian Trace Development District (ITDD) and Bonaventure Development District (BDD). The BDD is located within the NNRC Basin, which is another ESP basin. Therefore, the initiatives and strategies listed under the *Non-Structural BMPs* and *Public Outreach* Sub-sections below also apply to BDD.

Non-Structural BMPs:
The City of Weston employs a contractor to sweep 114 miles of curb on main roads three to four times per year. The City has inventoried all of the approximately 600 catch basins within the city right-of-ways using a computerized system and contracts to have them cleaned at least once every 18 months or as needed. The city also does aquatic control of the canals and lakes.

City crews do the following maintenance activities:

- Inspect catch basins regularly and after storms (French drains are maintained and inspected more often).
- Inspect and maintain water control structures (culverts, weirs and pumps).
- Remove from lakes floating trash, garbage and large items (bikes, shopping carts).

The city has three landscaping contractors (two of these contractors cover the ITDD area and the other one covers the BDD area) and each may subcontract the pest control or fertilizing. Contracts are for three to five years and include city right-of-ways (medians and swales), public parks, public facilities (fire stations, public utilities, etc); in certain areas, road maintenance extends from “edge of water to edge of water” (i.e., the maintenance goes beyond the swale to the edge of water). As per contract, contractors use only the amount of fertilizers that plants can take, which requires soil testing; phosphorus content on fertilizers used varies between 2% to 5%; pest control is based on a certain threshold before pesticides are applied and a log is kept for each application; irrigation is limited to 1 to 1.5 inches per cycle (twice per week on sandy areas and once per week on mucky areas); grass clippings on hard surface must be blown back onto grass; leaves must be removed.

A consultant in charge of the City of Weston Engineering Department does the permit approvals for construction and performs the construction inspections. During these inspections, it is ensured erosion and sedimentation control measures are in place and working properly.

Structural BMPs and Operational Changes:
Most of ITDD is served by a pump system. The District and the city’s consultant will investigate the possibility of modifying ITDD’s operational criteria to increase the

stormwater detention to 1.5 inches prior to discharging into the C-11 West Canal. A preliminary investigation is expected to be completed by March 2005.

Public Outreach:
The city has included general pollution prevention information in its quarterly newsletter. The newsletter is mailed to every household within the city and is also available for pick up at city facilities. The city has a webpage, public access channel and radio, and a public information staff, which the city can use for outreach purposes. The city also has a database listing of all home owner associations including the management companies.

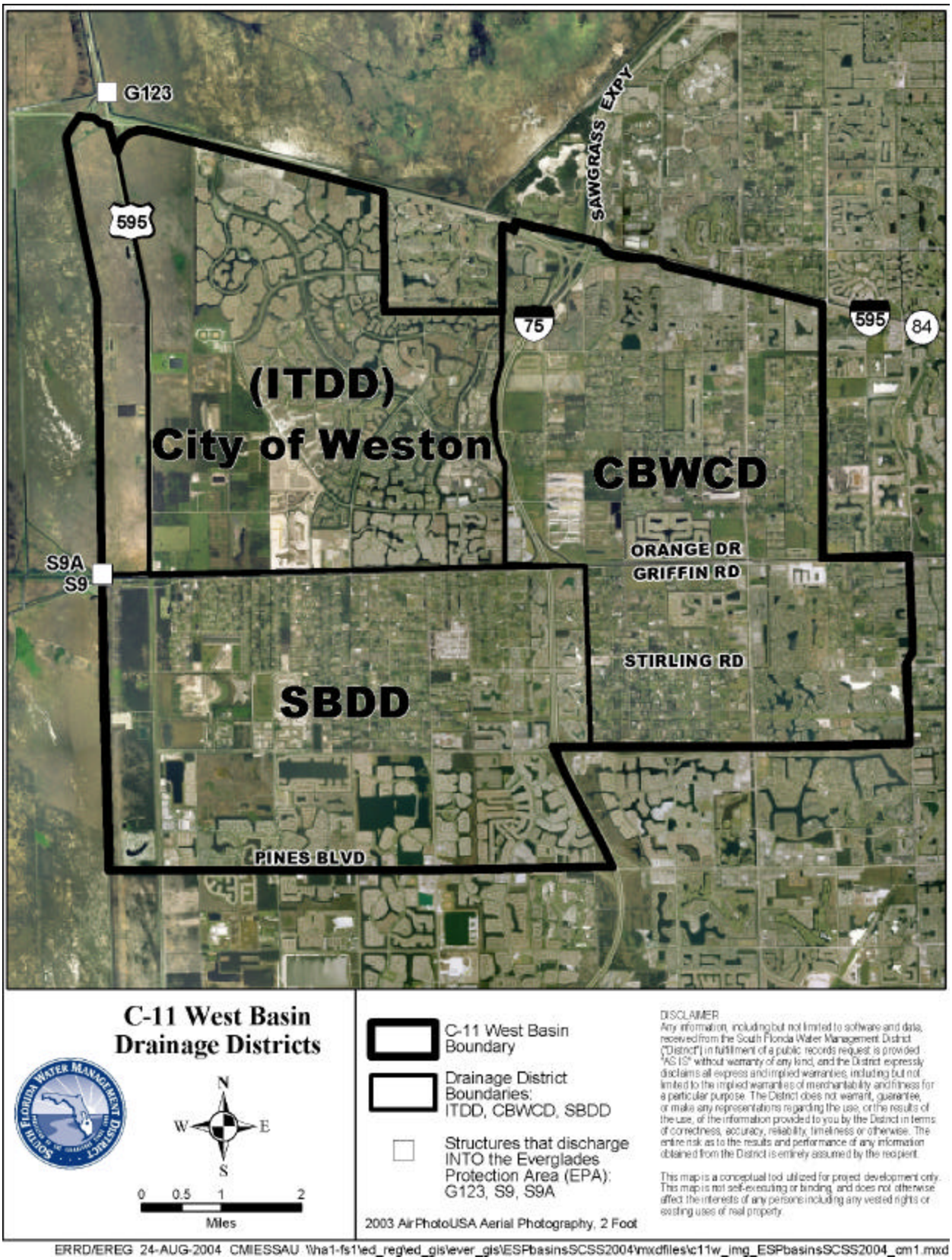

Figure 4. C-11 West Basin

2.4 North New River Canal Basin

The NNRC Basin (**Figure 5**) occupies an area of just under 30 square miles and is located southeast of WCA 2B, west of the Florida Turnpike. The bulk of the basin lies immediately north of I-595 in Broward County and covers most or part of the cities of Plantation, Sunrise and Weston. The NNRC Basin is almost completely developed with predominantly residential and commercial land uses. There are eight sub-basins within the NNRC Basin: Old Plantation Water Control District (OPWCD), Plantation Acres Improvement District (PAID), Bonaventure Development District within the City of Weston (BDD), the City of Sunrise, the City of Plantation (not within a drainage district), and Markham Park. The outfalls of the two remaining sub-basins (Lago-Mar Country Club and the Sunshine trailer park) are privately owned.

The "into" structure serving this basin and discharging into WCA 3A is G-123, located at U.S.27 and I-75. This structure is mainly used for water supply to WCA 3A and is not intended to be used for flood control. During large storm events, however, the pumps at G-123 may be turned on to provide some flood relief for the basin when storage capacity is available in the water conservation areas. Operation of these pumps is not on any regular schedule and varies significantly with rainfall and water stage. Flood relief for this basin is mainly provided by the G-54 structure located on the North New River Canal, just west of the Florida Turnpike, which discharges to tide.

The District has been collecting grab samples for water quality data at the G-123 structure since December 1982. A composite autosampler was installed at G-123 in October 2000. **Appendix B** includes flow-weighted mean TP concentrations for G-123 for WYs 1998 through 2004. The composite flow-weighted mean TP concentration for WYs 2001 through 2004 averages 15 ppb. The flow volume discharges from the G-123 pump station have been reduced significantly due to the operational changes implemented by the District, with none or insignificant flow volumes in the last two WYs.

Pursuant to the RAS, the District entered into cooperative and cost share agreements with four of the eight entities within the NNRC (**Table 3**). The agreements outline procedures to implement local water quality monitoring and improvement programs that will help meet the requirements of the EFA. The tasks considered in the agreements include the continuation of monitoring programs for upstream structures and implementation of appropriate BMPs designed to reduce nutrient loads being discharged in stormwater flows. The agreements include stipulations that require remedial actions be taken where "hot spots" are identified and may require construction of capital improvement projects.

Table 3. Agreements with local Drainage Districts and Cities in NNRC Basin

Drainage District/City	Amount of Agreement	Date of Agreement
OPWCD	$25,000	September 2001
PAID	$50,000	March 2002
BDD	$10,000	May 2002
CITY OF SUNRISE	$15,000	December 2003

Agreements with the remaining sub-basins were either not possible or not practical. The District will pursue implementation of non-structural BMPs in these sub-basins.

Upstream water quality monitoring has yielded data indicating that the concentrations of TP found in the basin generally range from 10 ppb to 80 ppb. A summary of the upstream water quality data and a map of the NNRC Basin showing these data are included in **Appendix B**. TP concentrations between 10 ppb and 25 ppb are associated with areas where permitted surface water management systems exist. TP concentration between 25 ppb and 50 ppb are associated to older residential areas which lack permitted surface water management systems. Areas where TP concentrations exceed 50 ppb are associated with golf courses or ongoing construction.

Public outreach initiatives for PAID, OPWCD, BDD, and the cities of Sunrise and Plantation will be developed as part of the ESP POP (**Appendix A**) and will be done in coordination with stakeholders and landowners in the basin.

For this basin, the LTP relies on the implementation of source controls and the discontinuation in use of the G-123 pump station after December 31, 2006, other than as may be absolutely necessary for water supply, until completion of the CERP project as the primary means of reducing TP discharges to WCA 3A from the NNRC Basin. The CERP Project, the WCA 2 and WCA 3 Diversion Project (CERP Component YY4) to be completed by 2018, includes the construction of a new basin divide structure across the North New River Canal at Markham Park and canals to reroute urban runoff from the Bonaventure pump stations to the North New River Canal downstream (east) of the new divide structure. The new divide structure will effectively eliminate urban runoff from the NNRC Basin from discharging to the WCA 3A. Seepage from WCA 2B that is collected in the L-35A borrow canal will be redirected into new canals, which will convey it south to the ENP.

Basin stakeholders have expressed concerns that discontinuing use of the G-123 pump station may reduce flood protection in the basin. Prior to discontinuing the use of the G-123 pump station, a detailed flood impact analysis will be performed to ensure that the basin's current level of flood protection is maintained. The LTP allocated funds to perform the flood impact analysis (Project Bc72). It is expected this analysis will be completed by July 2005.

Sections 2.4.1 through 2.4.4 below present initiatives and strategies for each of the drainage districts and cities within the NNRC Basin.

2.4.1 Plantation Acres Improvement District

PAID has a continuous inspection program which may revoke private stormwater management system permits older than 5 years if it is determined the private system is not working appropriately. In addition, PAID crews clean and spray canals to keep them free from excessive vegetation.

PAID is in the process of upgrading all 6 pump stations discharging into the C-42 Canal. The upgrades include replacement of pumps and motors as well as automation and remote control of operations. The cost of this project is estimated to be about $462,000 and is expected to be completed by 2006. Also, PAID expects to have a permanent budget item of $50,000 per year to improve road side swales and install catch basins and drainage pipes. The District will contribute $44,000 under its agreement with PAID toward the cost of these capital improvement projects.

2.4.2 Old Plantation Water Control District

OPWCD requires the renewal of surface water permits every 5 years to ensure stormwater management systems are working appropriately. In addition, OPWCD uses a harvester to remove excessive aquatic vegetation and performs regular canal maintenance.

OPWCD has proposed to add remote sensing equipment to its four pump stations to allow for collection of real time information. This information will allow reduction of pump discharges from the two pump stations that discharge to the North New River canal west of the G-54 structure, and redirection of some of the discharge through the other two pump stations, which discharge to tide.

2.4.3 Bonaventure Development District (City of Weston)

The City of Weston has direct control of BDD and ITDD. ITDD is located within the C-11 West Basin, which is another ESP basin. Therefore, the schedules and strategies listed under Section 2.3.3 also apply to BDD.

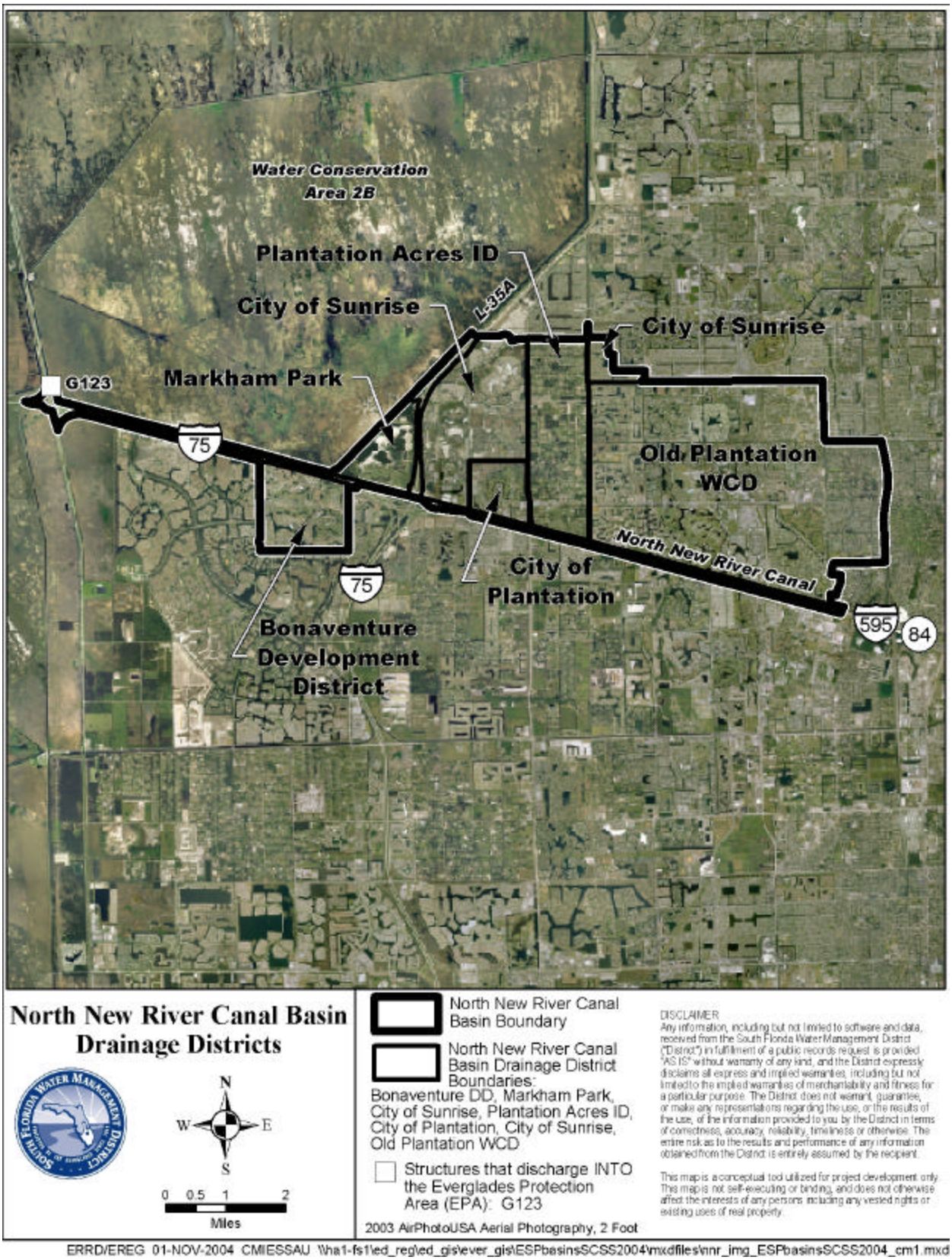

Figure 5. North New River Canal Basin

2.5 Feeder Canal Basin

The Feeder Canal Basin (**Figure 6**) is largely agricultural consisting of approximately 107 square miles (or 68,883 acres) located in Hendry County. The canals and structures within this basin provide flood protection and drainage within three sub-basins in addition to conveying excess runoff to WCA 3A for water supply and environmental use. The two major canals associated with the Feeder Canal Basin are the North Feeder Canal, and the West Feeder Canal. These two canals merge in the lower southeastern corner of the basin and discharge south through the S-190 structure into the L-28 Interceptor Canal and eventually into the WCA 3A. These major canals provide drainage for the western portion of the Big Cypress Seminole Indian Reservation, plus privately owned agricultural land lying north and west of the Reservation. Two secondary canals also exist in the Feeder Canal Basin located upstream of the West Feeder Canal.

Of the three major sub-basins within the Feeder Canal Basin, the North Feeder sub-basin consisting of approximately 23,150 total acres is under the operation of a single family enterprise known as the McDaniel Ranch. Land uses within this basin include cattle on unimproved and improved pastures, sugar cane, row crops and large tracts of undeveloped natural areas. Another sub-basin, a section of the Big Cypress Seminole Indian Reservation is about 13,850 acres. Seminole land uses are much like the North Feeder sub-basin in that they include cattle on unimproved and improved pastures, citrus, sugar cane and large tracts of undeveloped natural area. There are approximately 28 private property owners in the third major sub-basin, the West Feeder sub-basin. The approximately 31,900 acres of the West Feeder sub-basin is the headwater tributary to the West Feeder Canal with the primary surface water drainage system consisting of two canals, the Lard Can Canal and the Wingate Mill Canal.

The District has been collecting grab samples for water quality data at the S-190 structure since 1987 and a composite autosampler began collecting samples in August 2000. **Appendix B** includes flow-weighted mean TP concentrations for S-190 for WYs 1998 through 2004. The composite flow-weighted mean TP concentration for WYs 2001 through 2004 averages 102 ppb.

Water quality sampling is well established in two of the three sub-basins through a variety of permit conditions and/or land-owner agreements. In the North Feeder sub-basin water quality monitoring is detailed within an Environmental Resource Permit (#26-00239-P) issued to the McDaniel Ranch for their internal detention areas and final discharge locations (District's structures PC-17A and G-108) into the North Feeder Canal. In addition, the Landowner's Agreement between the McDaniel Ranch and the Seminole Tribe of Florida identifies the same two discharge locations (PC-17A and G-108) as water quality compliance points and enumerates the "Target Level" for this discharge at 50 ppb. TP concentrations and loads are summarized at the end of the WY and documented in compliance letters issued to the McDaniel Ranch. **Appendix B** includes a summary of TP concentrations and loads for the McDaniel Ranch for WYs 1999 through 2004. The summary combines flows and loads for both outfall structures

(PC-17A and G-108). The combined flow-weighted mean TP concentrations for WYs 1999 through 2004 have decreased from about 500 ppb to about 120 ppb.

A Landowner's Agreement between the District and the Seminole Tribe of Florida stipulates water quality monitoring within the Big Cypress Seminole Indian Reservation. Under this agreement, water quality for discharges into the Seminole reservation land from the West Feeder sub-basin is monitored at WWEIR. Water quality at the WWEIR monitoring location is representative of the entire West Feeder sub-basin. The flow-weighted mean TP concentrations for WYs 2002 through 2004 at this monitoring station for this period average 71 ppb. These data are summarized by the District in progress reports entitled *Total Phosphorus Load Calculations for Sites Stipulated in the SFWMD/Seminole Tribe Agreement.* The reports can be found at: http://www.sfwmd.gov/org/reg/esp/pdfs/seminole/index.htm.

Upstream water quality monitoring within the West Feeder sub-basin has been less intense. However, information from a past water quality sampling survey conducted by the District did not demonstrate high levels of TP (generally below 32 ppb). This grab sampling was considered a survey since it was conducted only a brief period of time between June 26, 1996 and October 31, 1997, and it did not attempt to quantify any other inputs such as flow, rainfall, land use, etc. A summary of grab sampling survey and a map of the Feeder Canal Basin showing these data are included in **Appendix B**.

The District will continue to evaluate water quality within this basin by initiating water sampling programs for discharges upstream of the S-190 structure. The objective of these programs will be either to confirm the level of success from present BMPs or highlight the need for additional BMPs.

A major component of the source control strategies in this basin includes the District's C-139 and Western Basins BMP Grant Program (Feeder Canal, L-28 and C-139 Basins). Within these basins, the District's Governing Board has approved funds of $900,000 since Fiscal Year 2002 in support of projects that would implement water quality improvement BMPs. Approximately $402,000 out of the $900,000 has been awarded to projects within the Feeder Canal Basin. The District has partnered with the Hendry Soil and Water Conservation District (HSWCD) to implement the grant program. Additionally, the Natural Resource Conservation Service (NRCS) provides cost share dollars through their Environmental Quality Improvement Program (EQIP), Wetland Restoration Program, and offers technical design and implementation of BMPs through their Resource Conservation Plans. FDACS provides further support and assistance to landowners which allows the landowners to reach a 75% cost-share requirement with the NRCS. Workshops that provide education about BMPs, available landowner assistance programs and guidance in developing on-farm conservation plans are ongoing. The 2002-2003 Western Basins Area BMP Grant Program Annual Report providing further details on these projects can be found at: http://www.sfwmd.gov/org/reg/esp/pdfs/wbasins_bmp_grant_program_annrpt.pdf.

For the Feeder Canal Basin, the LTP recommended the implementation of source controls. The LTP allocated funds to implement voluntary source controls or BMPs in the West Feeder sub-basin (e.g., those lands tributary to the Wingate Mill and Lard Can canals) as part of the BMP Incentive Program for the Feeder Canal Basin (Project Bc74 – Fiscal Years 2004-06).

The LTP also recommended the accelerated completion (by 2009) of the Big Cypress/L-28 Interceptor Modifications CERP Project as the primary means of reducing TP discharges to WCA 3A from the Feeder Canal Basin. The Big Cypress/L-28 Interceptor Modifications CERP Project, scheduled for completion in June 2015, will degrade the west berm along the L-28 Interceptor Canal to allow for sheet flow of stormwaters into the Big Cypress National Preserve and then into WCA 3A. The project also includes the conversion of the S-190 structure from a gated spillway to a pump station, and the construction of two STAs within the Feeder Canal Basin to meet applicable water quality standards in downstream receiving waters. The District has determined that the Big Cypress/L-28 Interceptor Modification CERP Project cannot be accelerated and completed by 2009. Therefore, this CERP project will be completed by 2015, as originally scheduled. The District also met with stakeholders in early 2004 to discuss the benefits of an interim pump at S-190 with an associated downstream plug to encourage sheetflow into Big Cypress National Preserve. However, after further investigation, it was determined the interim project was not feasible primarily because of concerns with the level of phosphorus concentrations.

The LTP also relies on the implementation of the Seminole Tribe Big Cypress Reservation Water Conservation Plan, a Federal Critical Restoration Project being funded by the USACE under Section 528 of the Water Resources Development Act of 1996. The project, scheduled to be completed by late 2006, involves improvements designed to improve water quality, restore wetland hydrology, increase water storage capacity and enhance flood protection within the reservation.

The LTP also relies on the completion of the surface water management system for the McDaniel Ranch (located within the North Feeder sub-basin). This system, currently scheduled to be completed by December 2006, will provide stormwater detention and pre-treatment prior to discharge. The system is being built pursuant of the Landowner's Agreement between the McDaniel Ranch and the Seminole Tribe of Florida which also requires the implementation of BMPs within the McDaniel Ranch. As part of the refurbishing of the PC-17A gated structure, District personnel incorporated various improvements such as, non-removable sediment boards, replacing wood boards with metal material, digging a sediment sump areas upstream of the structure, and improved vegetation barriers to effect BMPs directly at the structure. When possible at the time of scheduled maintenance for other structures, the District will optimize their design and operation to reduce nutrient loading.

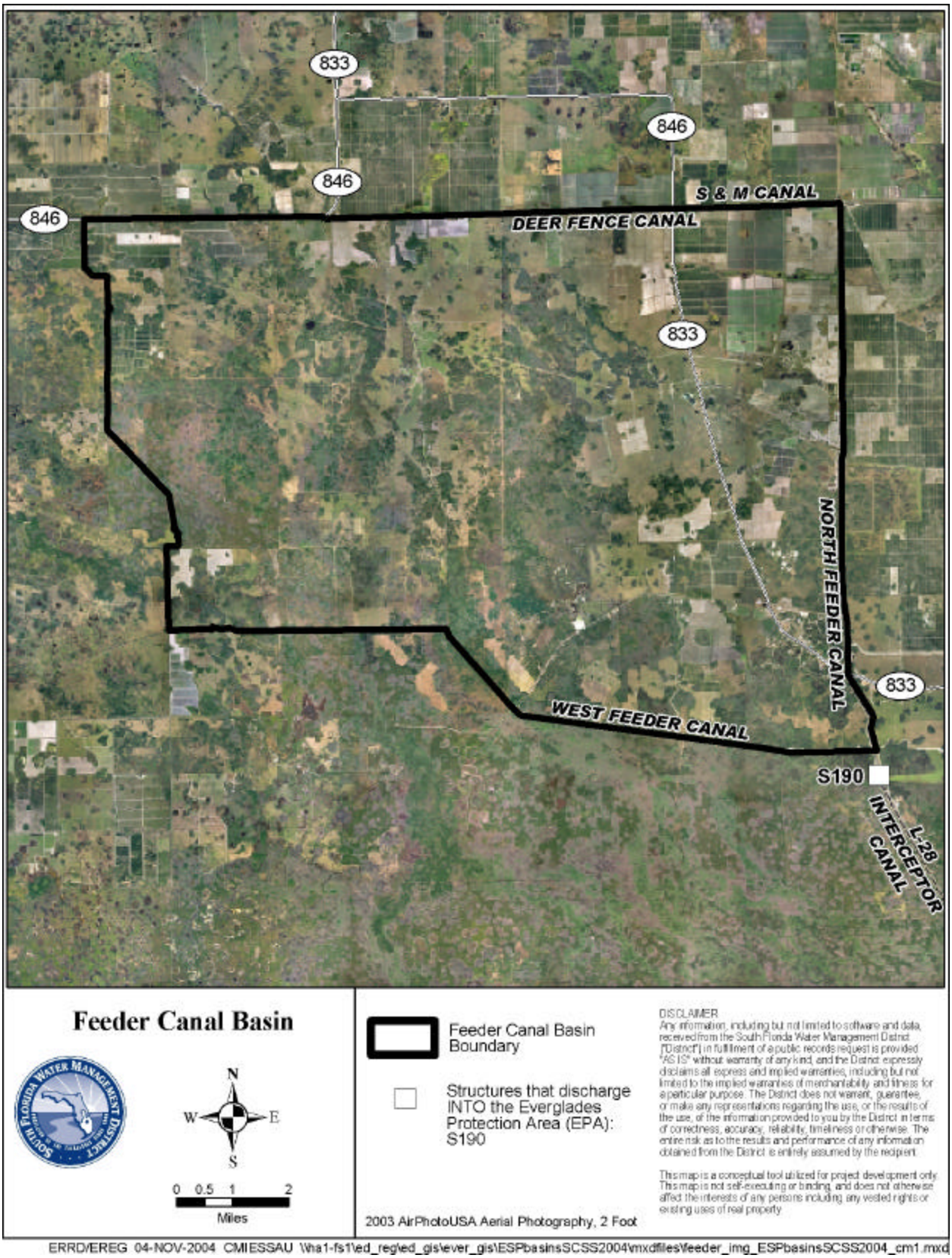

Figure 6. Feeder Canal Basin

2.6 L-28 Basin

The L-28 Basin (**Figure 7**) is approximately 113 square miles with portions located in Broward, Hendry and Collier Counties. The L-28 Basin is entirely occupied by four landowners. The C-139 Annex (approximately 25% of the basin) is comprised of the U.S. Sugar Corporation's Southern Division Ranch, Unit 1. The Big Cypress Seminole Indian Reservation occupies approximately 34% of the basin. Approximately 28% of the basin is situated in the Miccosukee Indian Reservation. The remaining 13% of the basin is within the Big Cypress National Preserve. Wetland and agricultural land uses account for approximately 96 percent of the basin area. Land uses with the Big Cypress Seminole Indian Reservation include cattle on unimproved and improved pastures, citrus, sugar cane and large tracts of undeveloped natural area. The Miccosukee Indian Reservation includes largely native areas with only a single cattle operation and a commercial fuel facility. There are also additional lands that have been converted to citrus or sugar cane and crops.

The surface water management system in the L-28 Basin provides drainage and flood protection in addition to providing water to WCA 3A when necessary for water supply purposes. The L-28 borrow canal is the primary drainage canal, running north/south for a distance of approximately 10 miles along the eastern border of the basin and receives flow from the L-3/L-4 borrow canal system. The L-28 borrow canal conveys stormwater runoff to the S-140 pump station which discharges it directly into WCA 3A. The L-28 Interceptor Canal, which borders the basin on the southwest, conveys discharges from the S-190 structure (Feeder Canal Basin) to WCA 3A and is separated from the L-28 Basin by a levee.

The C-139 Annex presently drains to the L-28 borrow canal at the north line of the Big Cypress Seminole Indian Reservation. Runoff from the C-139 Annex will be diverted to STA-6 in concert with the presently planned construction of STA-6, Section 2 (scheduled for completion before December 31, 2006). Upon completion of the diversion, the total area of the L-28 Basin will be effectively reduced to approximately 85 square miles.

The District has been collecting grab samples for water quality data at the S-140 structure since 1987 and a composite autosampler began collecting samples in August 2000. **Appendix B** includes flow-weighted mean TP concentrations for S-140 for WYs 1998 through 2004. The composite flow-weighted mean TP concentration for WYs 2001 through 2004 averages 63 ppb.

A Landowner's Agreement between the District and the Seminole Tribe of Florida stipulates water quality monitoring within the Big Cypress Seminole Indian Reservation. Under this agreement, water quality for discharges into and from the Seminole reservation land within the L-28 Basin is monitored at L28U, G-409, and USSO. Flow-weighted mean TP concentrations for WYs 2002 through 2004 at these monitoring stations range between 58 and 98 ppb. These data are summarized by the District in

progress reports entitled *Total Phosphorus Load Calculations for Sites Stipulated in the SFWMD/Seminole Tribe Agreement*. The reports can be found at: http://www.sfwmd.gov/org/reg/esp/pdfs/seminole/index.htm.

The NRCS has several programs that provide support and assistance to landowners in the L-28 Basin. These programs have helped implement water quality improvement projects and NRCS has provided cost share dollars through their EQIP, Wetland Restoration Program, and through the technical design and implementation of BMPs through their Resource Conservation Plans. Workshops that provide education about BMPs, available landowner assistance programs and guidance in developing on-farm conservation plans are ongoing.

For the L-28 Basin, the LTP also relies on the implementation of the Miccosukee Water Management Plan, which is a Critical Project to construct a managed wetland on the Miccosukee Indian Reservation. The project will convert approximately 900 acres of tribally owned cattle pastures into wetland retention/detention to provide water storage capacity as well as water quality enhancement for water that will be discharged to WCA 3A through the S-140 pump station. This project is being designed to accommodate flows and loads from Miccosukee Indian Reservation lands only. Completion of the project is currently planned for 2010.

The LTP also relies on the Seminole Tribe Big Cypress Reservation Water Conservation Plan to be implemented under the NRCS PL 83-566 Small Watershed Project Program. The plan proposes construction of 3,835 acres of retention areas designed to improve water quality for flows from the Seminole Reservation lands only. Funding for this project has not yet been authorized.

As recommended by the LTP, the District will pursue the completion of the above projects by October 2008. This requires close cooperation between tribal, state, and federal agencies.

Another project affecting the L-28 Basin is the CERP Project Component RR4. This CERP Project, expected to be completed by 2015, includes the relocation and enlargement of the S-140 pump structure to improve hydro-pattern restoration to the northwest corner of WCA 3A and increased flows to the region. It is assumed that the water quality of discharges from the relocated pump structure will be sufficient to meet applicable water quality standards in downstream receiving waters (WCA 3A).

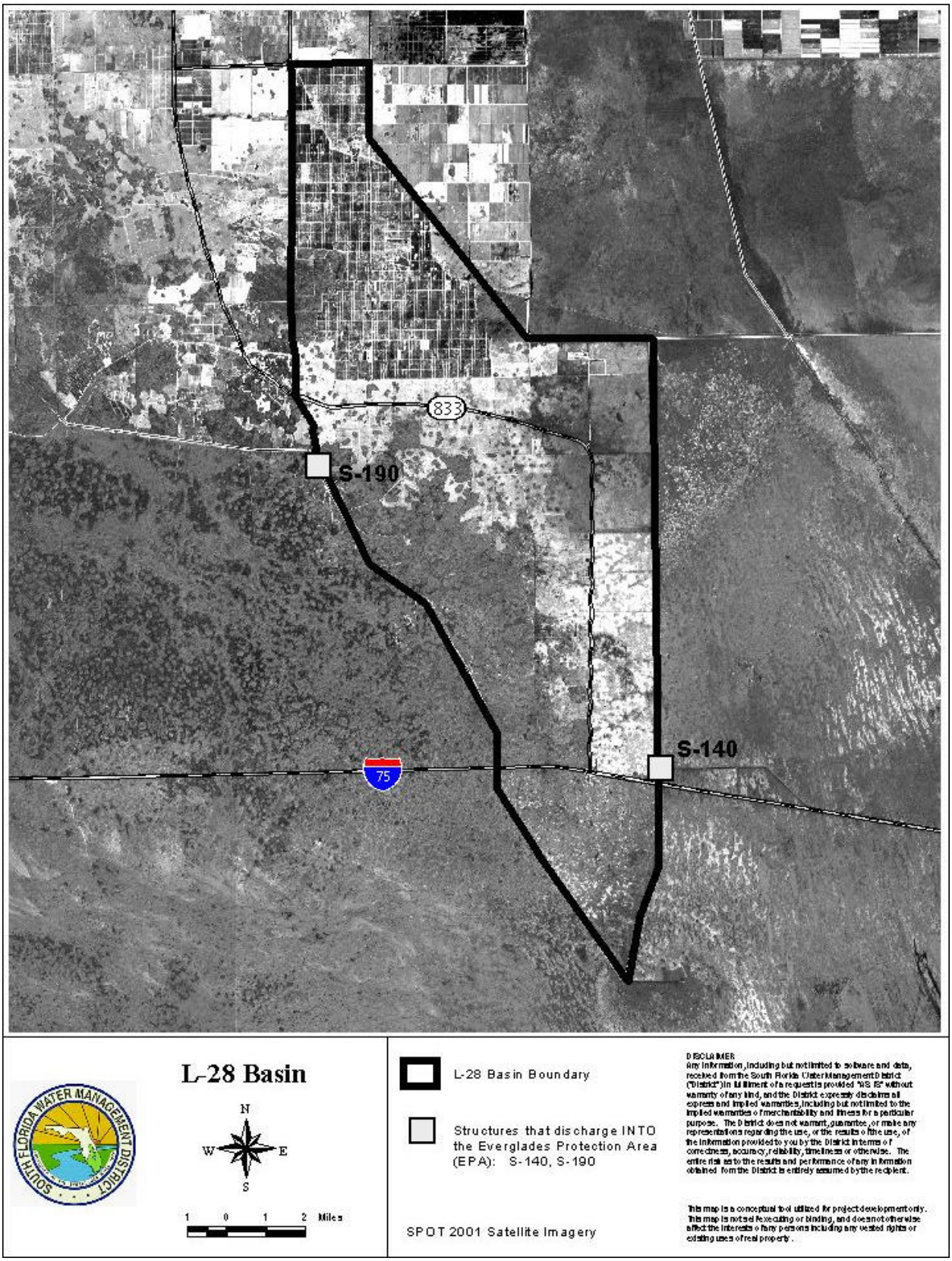

Figure 7. L-28 Basin

2.7 Boynton Farms Basin

The Boynton Farms Basin (**Figure 8**) is the smallest ESP basin at approximately 421 acres, or a little over 0.66 square miles. It is located in southern Palm Beach County, along the eastern border of the Arthur R. Marshall Loxahatchee National Wildlife Refuge which is on the eastern side of WCA 1A. Land use in this basin is primarily agricultural, and structures and drainage canals located there are associated with agricultural water usage and drainage needs. All discharge structures in this basin are owned and operated by private landowners. Currently, there are three farms within this basin known as Mecca Farm, Amestoy Farm, and DuBois Farm. Crops grown on these lands mainly include row crops such as peppers, tomatoes and ornamentals. Local governmental agencies include the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge), the Lake Worth Drainage District (LWDD), and Palm Beach County.

No cooperative agreements are in place with these private landowners because the permits that have been issued to them do not allow for any discharge into the Refuge property. The Refuge headquarters property, which is considered part of the EPA even though it is outside the boundaries of WCA 1, receives discharges from this basin, but no discharges from this basin reach WCA 1.

Although overall basin boundaries have been finalized, there are still some issues in dispute. It is unclear whether some of the discharge structures are actually pumping onto Refuge property or are discharging onto the farmers' property bordering the Refuge with stormwater then sheet-flowing onto the Refuge. Refuge water quality data have established that elevated nutrient levels on the Refuge property are linked to these discharges.

Currently, the District has limited access to sampling sites. Water quality sampling for the discharges from this basin has been conducted by the District from April 2000 to the present. Water quality monitoring is only conducted during flow events. A summary of the upstream water quality data and a map of the Boynton Farms Basin showing these data are included in **Appendix B**. Monitoring results show all three farms have similar levels of TP concentrations in their discharges. The average TP concentration for all monitoring sites in this basin is slightly above 1,000 ppb. Information regarding flow data from these properties is not available to the District at this time.

The District continues to offer technical support to help landowners comply with water quality criteria through contact with landowners, Refuge staff, and the LWDD personnel. The Williams Nursery pump on the north side of the Refuge headquarters property was voluntarily removed. As a result, discharges from this nursery into the Refuge property no longer occur and the property was removed from the Boynton Farms Basin boundaries.

The entire Boynton Farms Basin is currently within the footprint of the Palm Beach County Agriculture Reserve Water Reservoir CERP Project (which is also part of the East Coast Buffer Project). The District is pursuing acquisition of this area through a

willing seller program. In July 2004, Palm Beach County purchased the Amestoy properties located within the Boynton Farms Basin, consisting of approximately 216 acres. These properties are currently under lease for farming through May 2005. The District may consider acquiring all or a portion of these Amestoy properties from the county as part of the CERP project. However, at this time the District has not determined if it will proceed with land acquisition activities in this area.

Landowners within the basin, whose properties are not purchased as part of the CERP project and continue discharging onto the Refuge property, may need to implement capital improvement projects or other remedies to redirect all runoff discharges away from the Refuge property. The District will investigate options to divert stormwaters away from the Refuge Headquarters property and into the LWDD. The LWDD has been apprised of the issues and is working on expanding capacity to the east to accept stormwater flows.

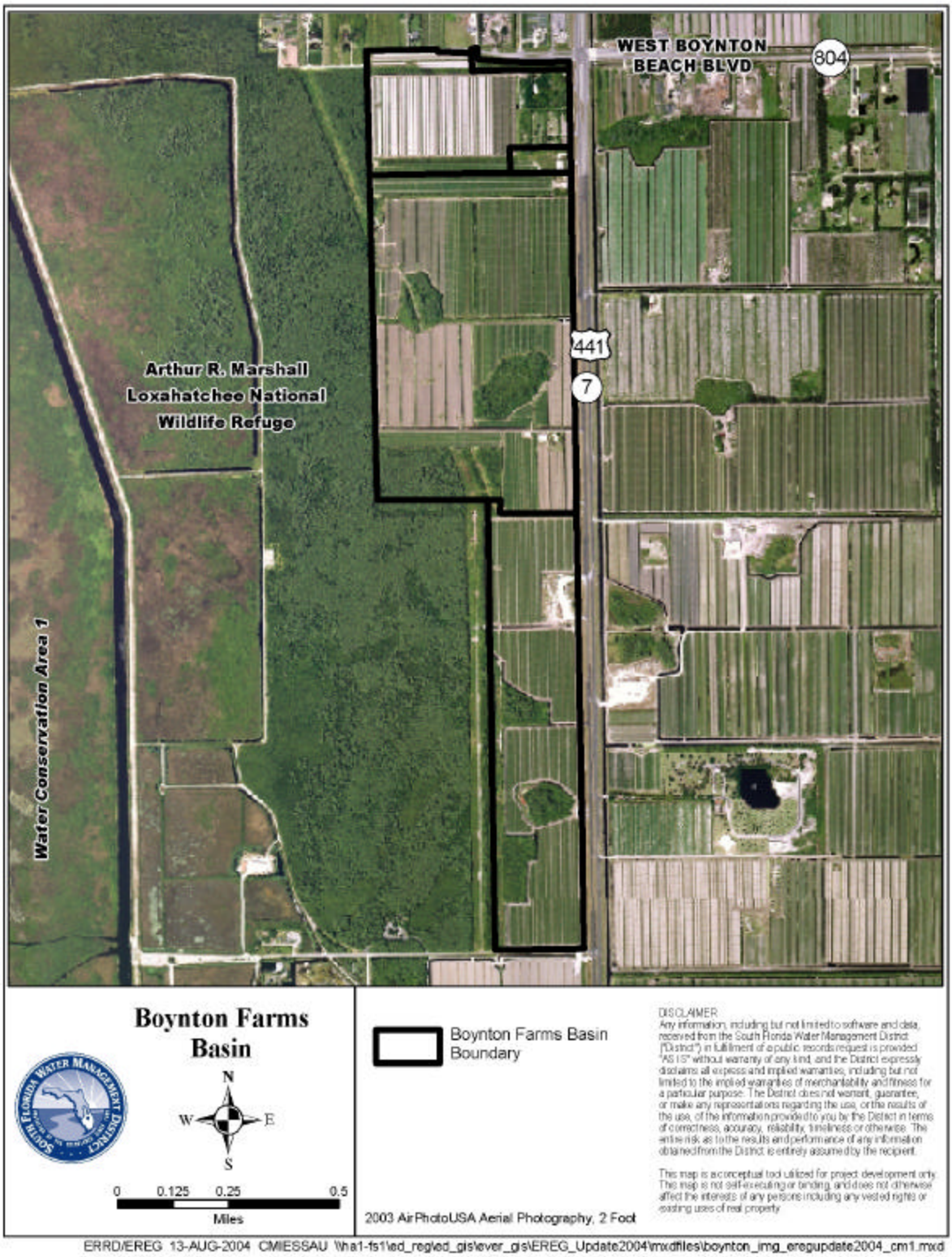

Figure 8. Boynton Farms Basin

2.8 C-111 Basin

The C-111 Basin (**Figure 9**) is located in the southernmost portion of Miami-Dade County adjacent to the Everglades National Park (ENP). The predominant land use in this basin is agricultural, although portions of Florida City and Homestead lie within the basin. The C-111 basin is under the jurisdiction of Miami-Dade County Department of Environmental Resources Management. In the 1960's, the area was channelized as part of the Central & Southern Florida Project for Flood Control and Other Purposes. Major restoration efforts have been ongoing in this area in recent years with goals intended to promote improvement of hydroperiods and timing of water deliveries to ENP while maintaining water table elevations to prevent salt water intrusion into the local groundwater.

The C-111 Basin covers an area of approximately 100 square miles. There are five main operational canals in the C-111 Basin: C-111, C-111E, C-113, the L-31N borrow canal and the L-31 W borrow canal. These canals have three functions: (1) to provide drainage and flood protection for the C-111 Basin; (2) to supply water to the C-111, C-102 and C-103 Basins, and to the ENP, specifically to Taylor Slough and the Panhandle of the Park; and (3) to maintain a groundwater table elevation near the lower reach of C-111 adequate to prevent intrusion of saltwater into local groundwater. Water is supplied to the C-111 Basin by the South Dade Conveyance System by way of the L-31N borrow canal.

There are three structures, S-18C, S-175 and S-332, within the C-111 Basin discharging into the ENP that are included in the Non-ECP permit. The L-31W borrow canal is used to make water deliveries to Taylor Slough in ENP by way of S-332D, S-332 and S-175. Water is discharged to the Panhandle of the park by way of overbank flow along the south side of the C-111 Canal between S-18C and S-197. The S-18C structure is located on the C-111 Canal approximately 2 miles south of the confluence of the C-111 Canal and the C-111E Canal in the Southern Glades region. Structures S-175 and S-332 are in close proximity along the L-31W borrow canal along the south side of the Frog Pond, approximately 1.5 miles north of the entrance to the ENP. Water quality data have been collected at these structures since 1978 by the District and the USACE. Currently, the levels of TP in the C-111 Basin are below the 10 ppb level of concern. Monitoring at the "into" structures will continue, however, since these concentrations may change as future projects are constructed and seepage water entering the basin from the ENP is reduced. Upstream monitoring is performed by the District at the S-176, S-178 and S-332D structures. Results of the monitoring at the "into" and upstream structures are summarized in **Appendix B**.

In 2003, The United States Department of Agriculture completed their final report on the fate and transport of indicator pesticides, the efficacy of summer cover crops in controlling pesticide contamination of surface and ground water, and attenuation of pesticides during their transport in the upper Biscayne aquifer in cooperation with the University of Florida Tropical Research and Education Center (UF-TREC). This research was done under a $200,000 cooperative agreement with the District. Results

from this study will contribute to the establishment of risk reduction strategies for pesticide use, enhance water quality and promote agricultural sustainability.

Also in 2003, The District entered into a $73,737 cooperative agreement with UF-TREC to perform BMP research to determine the efficacy of zeolite as a soil amendment on water holding capacity and movement of phosphorus, ammonium and nitrate in agricultural soils in the C-111 Basin. In addition, the District, with NRCS, has sponsored a Mobile Irrigation Lab in this area to help local growers improve their irrigation practices. The main sources of public education in this basin are UF-TREC and the University of Florida Institute of Food and Agricultural Sciences. The results and recommendations of the studies described above will be disseminated to the southern Miami-Dade County farm community through these institutions.

Emergency actions to protect the Cape Sable Seaside Sparrow (*Ammodramus maritimus mirabilis*) continue to influence the C-111 system operations under Emergency Order No. 9 authorizing the construction and operation of the structures (S-332B, S-332C, and S-332D) and associated detention areas as outlined in the Interim Operational Plan. The biological opinion issued by the U.S. Fish and Wildlife Service established water management targets for the eastern populations of the sparrow located on the edge of the ENP that borders the C-111 Canal and the L-31N borrow canal. Construction of the detention areas and structures in this area is complete.

The C-111 Basin is part of the Combined Structural and Operational Plan (CSOP). CSOP is currently being developed by the USACE in partnership with the District. This Plan will include a complete analysis and redesign of drainage patterns from the Tamiami Trail south to the ENP. Drainage patterns in this basin have historically been in the form of surface water movement from west to east with very few canals or structures. In addition, surface water infiltrated directly into the ground water with high seepage influence from the ENP. Flow patterns are changing to pumped systems directing water to the west with goals to improve conditions in the Taylor Slough portion of ENP. In the lower C-111 Basin, water will sheetflow to the south and east to improve freshwater flows to Florida Bay and the panhandle of ENP.

Several Federal projects are scheduled for construction in this area and are at different stages of implementation. The Federal initiatives are: the C-111 Project, the Modified Water Deliveries to Everglades National Park Project and the CERP C-111 Spreader Canal Project. The District shares the cost of implementing the C-111 and CERP projects and participates in PDTs formed to support CERP implementation. The Project Management Plans are available on the CERP website at: www.evergladesplan.org.

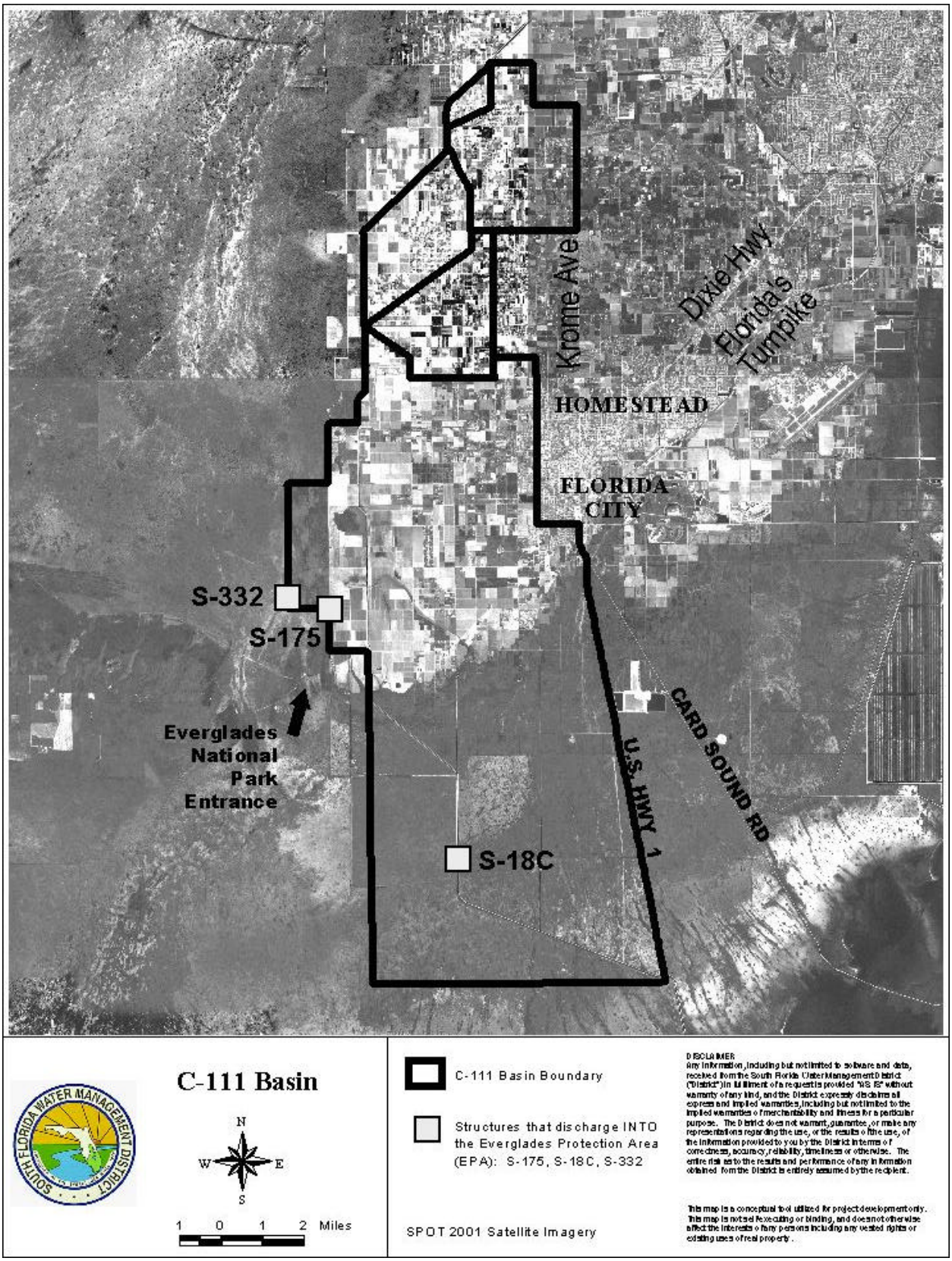

Figure 9. C-111 Basin

3.0 EVERGLADES STORMWATER PROGRAM FINDINGS AND FUTURE DIRECTIONS

The portion of the District's water quality monitoring program that has been implemented as a result of the EFA and the Non-ECP permit indicates that phosphorus concentrations are greater than 10 ppb in discharges from seven of the eight ESP basins. The District will continue to monitor water quality in accordance with the Non-ECP permit to measure progress toward achieving compliance with state water quality standards.

The ultimate goal of the Everglades Stormwater Program in the ESP basins is the reduction of phosphorus entering the EPA by controlling it at its source. The reduction will come through voluntary compliance involving BMPs, capital projects, education and cooperative efforts to reduce TP concentrations. Extensive coordination with local governments, the 298 District, the Seminole Indian Tribe of Florida and the Miccosukee Tribe of Indians of Florida, and other state and federal agencies will continue to be essential for achieving the goals and requirements of the EFA, the Non-ECP permit, and the future Long-Term Compliance Permit. The District has executed several cooperative/cost-share agreements with local governments to implement water quality improvement plans involving BMPs and operational modifications. The public involvement element of the ESP will provide additional avenues of participation for environmental groups, agricultural and urban communities, locally impacted industries, and the general public. Coordination efforts with CERP, ongoing critical projects within Non-ECP basins, the LTP, and local governments are also facilitating the development of long-term solutions for achieving statewide water quality standards. These efforts have resulted in detailed action plans (schedules and strategies) which have been or are to be implemented in each ESP Basin. The actions plans for water quality improvements are designed to meet the phosphorus criterion in the EPA. All LTP projects described for the ESP basins (Projects Bc71 through Bc75) have been initiated and are on schedule and within proposed budgets.